PROC. ENTOMOL. SOC. WASH.
83(4), 1981, pp. 625–630

REEVALUATION OF PLEISTOCENE SCARAB BEETLES FROM RANCHO LA BREA, CALIFORNIA (COLEOPTERA: SCARABAEIDAE)

Scott E. Miller, Robert D. Gordon, and Henry F. Howden

(SEM) Santa Barbara Museum of Natural History, Santa Barbara, California 93105; (RDG) Systematic Entomology Laboratory, IIBIII, Agric. Res., Sci. and Educ. Admin., USDA, % National Museum of Natural History, Washington, D.C. 20560; (HFH) Department of Biology, Carleton University, Ottawa, Ontario K1S 5B6.

Abstract.—Late Pleistocene Scarabaeidae described from the Rancho La Brea asphalt deposits, Los Angeles, California are reviewed. *Canthon praticola* LeConte (=*C. praticola vetustus* Pierce, n. syn.) and *C. simplex* LeConte (=*C. simplex antiquus* Pierce, n. syn.) still occur in southwestern North America. *Copris pristinus* Pierce and *Onthophagus everestae* Pierce are apparently extinct, perhaps due to terminal Pleistocene extinctions of large mammals. *Paleocopris* Pierce is a new synonym of *Phanaeus* MacLeay. *Phanaeus labreae* (Pierce), n. comb., and *Serica kanakoffi* Pierce cannot be placed at species level due to the nature of the holotypes.

This is one of a series of papers (Miller and Peck, 1979; Doyen and Miller, 1980) reevaluating the fossil insects described from the Rancho La Brea asphalt deposits, Los Angeles County, California. The Scarabaeidae of this deposit were described by Pierce (1946b, c); one species was reviewed by Matthews and Halffter (1968). We have reevaluated Pierce's type-specimens, as well as some of the more recently excavated representatives of this family. The bulk of the new material from Rancho La Brea, as well as that from the McKittrick and Carpinteria asphalt deposits, must await future study. As discussed by Miller and Peck (1979), Pierce was prone to extreme taxonomic splitting, and most of his Pleistocene taxa are synonyms of extant species. Subspecific names are inappropriate because the fossils do not represent geographic races.

Locality, age, and ecological data for Rancho La Brea were discussed by Pierce (1946a) and Miller and Peck (1979), and will later be treated in greater detail by Miller. The scarabs came from Pits A, 13, 16, and 81. These excavations all included a Late Pleistocene biota, but assignment of exact ages is impossible in most cases because most of the Pierce specimens are without stratigraphic data. All specimens are deposited in the Natural His-

tory Museum of Los Angeles County Invertebrate Paleontology collection (LACMIP).

Taxonomy

Canthon (*Boreocanthon*) *praticola* LeConte

Canthon praticola LeConte, 1859: 10.
Canthon praticola vetustus Pierce, 1946b: 122. New Synonymy.
Boreocanthon praticola vetustus of Halffter, 1959: 176.

The holotype elytron (LACMIP 2592 = C117a) and paratype elytron (LACMIP 2593 = C118a), both from Pit 81, of *Canthon praticola vetustus* are apparently *C. praticola*, but there is no justification for a subspecific name. *Canthon praticola* does not presently occur in California; it is distributed from British Columbia and Alberta in Canada to Wyoming, Colorado, Kansas, Oklahoma, Texas, and Arizona in the United States and Sonora and possibly Chihuahua in Mexico (Halffter, 1959). *Boreocanthon* was given generic status by Halffter (1958), but was later lowered to subgeneric status (Halffter and Martinez, 1977).

Canthon (*Boreocanthon*) *simplex* LeConte

Canthon simplex LeConte, 1857: 41.
Canthon simplex antiquus Pierce, 1946b: 120–122, figs. 1–3. New Synonymy.
Boreocanthon simplex antiquus of Halffter, 1959: 176.

The holotype prothorax with legs (LACMIP 2594 = C114d) and paratype elytra (LACMIP 2595–2597 = C114a–c), all from Pit A, of *Canthon simplex antiquus* are apparently *C. simplex*, but a subspecific name is unjustified. *Canthon simplex* presently occurs in Arizona, California, and the Pacific Northwest.

Copris pristinus Pierce

Copris pristinus Pierce, 1946b: 124–130, figs. 4–9, 18–19.
Copris pristinus of Matthews, 1961: 35, 67, 69; Halffter, 1959: 176, 1964: 22; Matthews and Halffter, 1968: 160–161, figs. 7–8.

Examination of paratypes of *Copris pristinus* by Matthews and Halffter (1968) revealed that *C. pristinus* is not a member of the *armatus* complex as previously thought (Matthews, 1961; Halffter, 1959, 1964). They concluded that *C. pristinus* is "an extinct species which in most essentials fits well within the *rebouchei* complex, as defined by Matthews (1961), but which shows some less important features of the *armatus* complex." The *rebouchei* complex includes three extant species, one of which, *C. lecontei* Matthews, extends today to southern Arizona. Thus, since the Pleistocene, *Copris* has apparently retreated from California. The holotype head (LACMIP 2850 = C49p) and 29 paratypes (LACMIP 2853–2878, 4329–4333) are from Pit A; 6 paratypes (LACMIP 2851, 2879–2883, 4328) are from Pit 16

dump; and 3 paratypes (LACMIP 2884–2886) are from the inside of a *Felis atrox* (Leidy) skull (LACM HC 183) from depth 12.5 feet (3.8 m) in Pit 13. The ages of the specimens from Pits A and 16 are uncertain, but probably Late Pleistocene. A Late Pleistocene age for the Pit 13 specimens may be assumed because of their association with the extinct *F. atrox*, although such data must be used with care (Harington, 1980).

Onthophagus everestae Pierce
Fig. 1

Onthophagus everestae Pierce, 1946b: 131, figs. 15–17.

The holotype head (LACMIP 3057 = C115a) from Pit 81 is unlike any described species of *Onthophagus* in North or Central America and must be considered a valid and extinct species. Its closest relatives appear to be *Onthophagus corrosus* Bates (known from Mexico) and *Onthophagus cuevensis* Howden (known from San Luis Potosi and Tamaulipas in Mexico; Howden, 1973), but *O. everestae* is quite different from these and is readily distinguished by the well-developed carina (Fig. 1). The paratype leg (LACMIP 3058 = C115b), also from Pit 81, is a species of *Canthon* in the *imitator* group, similar to *Canthon obliquum* Horn of Baja California.

Phanaeus labreae (Pierce), New Combination
Fig. 2

Paleocopris labreae Pierce, 1946b: 130, figs. 10–14.
Paleocopris labreae of Halffter, 1959: 176; Matthews, 1961: 35.

The holotype head (LACMIP 3059 = C116a), from Pit 81, of *Paleocopris labreae* is a very large but very minor male referable to the genus *Phanaeus*, which makes *Paleocopris* a new junior synonym of *Phanaeus* (New Synonymy). The structure of the lateral clypeal carina of the head (Fig. 2) is characteristic of the *videx* group of Edmonds (1972), but we have not attempted specific identification due to the broken and distorted condition of the holotype. The paratype legs, all from Pit 81, belong to other genera: LACMIP 3062 (=C116d) and 3063 (=C116e) are *Copris*, 3060 (=C116b) may be *Deltochilum*, and 3061 (=C116c) is probably *Onthophagus* (the last two lack characters for generic placement).

Serica kanakoffi Pierce

Serica kanakoffi Pierce, 1946c: 132, figs. 1–2.

The unique holotype (LACMIP 3071 = C107a) is a head from Pit 81. *Serica* is a taxonomically very difficult genus in which species are superficially similar. Positive identifications must usually be based on characters of the male genitalia (Dawson, 1919). In view of the nature of the genus, it is impossible to place this taxon adequately. It is probable, however, that *S. kanakoffi* is really one of the many extant California species.

Figs. 1, 2. Holotype heads. 1, *Onthophagus everestae* (scanning electron microscope photograph by L. E. C. Ling, Carleton University). 2, *Phanaeus labreae* (photograph by V. E. Krantz, Smithsonian Institution).

Discussion

Of the six scarab species reported by Pierce (1946b, c) from Rancho La Brea, two are extant species, and two are extinct species. The other two cannot be placed to species, but present evidence does not give us reason to consider them extinct. The extinct species differ from all described

species, but it is possible that they might eventually be rediscovered in Mexico. Congeners of the two extinct species are associated with mammal dung.

The modern California scarab fauna includes (in San Diego County) only one rare *Onthophagus*, *O. cartwrighti* Howden (1973). Species closely related to *O. cartwrighti* occur in pack rat nests in Arizona, but *O. cartwrighti* belongs to a different species group than does *O. everestae*, and there is no reason to suspect that their habits would be similar. All the other members of the genera *Onthophagus*, *Copris*, and *Phanaeus* now occur from central Arizona eastward or along the Sierra Madre to the south and feed on the dung of various mammals. In the Late Pleistocene a diverse and abundant large mammal fauna existed at Rancho La Brea (Marcus, 1960; Stock, 1956). This fauna underwent a very late Pleistocene extinction, probably due to climatic change (drying and warming with increased seasonality), and perhaps some influence from human hunting (Johnson, 1977; Axelrod, 1967; Martin and Neuner, 1978). The modern ranges of *Onthophagus*, *Copris*, and *Phanaeus* corroborate increasing aridity in post-Pleistocene California. It is probable that the resultant reduction of dung availability, as well as direct effects of the changing climate caused the demise of these scarabs. However, even if the large mammal fauna had survived into the Holocene, the scarabaeine fauna might not have survived the present seasonal dry periods, since their successful reproduction requires adequate moisture.

At Rancho La Brea, the only other insect species included in contemporary studies that is not known to be extant is the tenebrionid beetle *Coniontis rennans* Pierce (Doyen and Miller, 1980). It is probable, however, that this species still occurs in California and has been overlooked in museum collections of this large and taxonomically difficult genus. Studies of other deposits in North America (Ashworth, 1979; Matthews, 1977) and Europe (Coope, 1978) indicate that almost all Pleistocene insects represent extant species.

Acknowledgments

E. C. Wilson (Natural History Museum of Los Angeles County) loaned Pierce's types for study. W. A. Akersten, C. L. Hogue, G. T. Jefferson, C. A. Shaw (all at the Natural History Museum of Los Angeles County), L. F. Marcus (Queens College), and A. R. Hardy (California Department of Food and Agriculture) provided background data. Miller's work was partially supported by a University of California President's Research Fellowship, and partially done at the Smithsonian Institution.

Literature Cited

Ashworth, A. C. 1979. Quaternary Coleoptera studies in North America: past and present, pp. 395–406. *In* Erwin, T. L., G. E. Ball, and D. R. Whitehead, eds., Carabid beetles: Their Evolution, Natural History, and Classification. Dr. W. Junk B.V., The Hague.

Axelrod, D. I. 1967. Quaternary extinctions of large mammals. Univ. Calif. Publ. Geol. Sci. 74: 1–42.

Coope, G. R. 1978. Constancy of insect species versus inconstancy of Quaternary environments. Symp. R. Entomol. Soc. Lond. 9: 176–187.

Dawson, R. W. 1919. New species of *Serica* (Scarabaeidae).—1. J. N.Y. Entomol. Soc. 27: 32–39.

Doyen, J. T. and S. E. Miller. 1980. Review of Pleistocene darkling ground beetles of the California asphalt deposits (Coleoptera: Tenebrionidae, Zopheridae). Pan-Pac. Entomol. 55: 1–10.

Edmonds, W. D. 1972. Comparative skeletal morphology, systematics and evolution of the phanaeine dung beetles (Coleoptera: Scarabaeidae). Univ. Kans. Sci. Bull. 49: 731–874.

Halffter, G. 1958. Dos neuvos generos de Canthonini (Col. Scarabaeidae). Ciencia (Mex. City) 17: 207–212.

———. 1959. Etologia y paleontologia de Scarabaeinae (Coleoptera, Scarabaeidae). Ciencia (Mex. City) 19: 165–178.

———. 1964. La entomofauna Americana ideas a cerca de su origen y distribucion. Folia Entomol. Mex. 6: 1–107.

Halffter, G. and A. Martinez. 1977. Revision monografica de los Canthonina Americanos, IV parte. Clave para generos y subgeneros. Folia Entomol. Mex. 38: 29–107.

Harington, C. R. 1980. Pleistocene mammals from Lost Chicken Creek, Alaska. Can. J. Earth Sci. 17: 168–198.

Howden, H. F. 1973. Four new species of *Onthophagus* from Mexico and the United States (Coleoptera: Scarabaeidae). Proc. Entomol. Soc. Wash. 75: 329–337.

Johnson, D. L. 1977. The California ice-age refugium and the Rancholabrean extinction problem. Quat. Res. (N.Y.) 8: 149–153.

LeConte, J. L. 1857. Report upon the insects collected on the survey. Explorations and surveys for a railroad route from the Mississippi River to the Pacific Ocean—War Department XII, pt. 3, 1860, pp. 1–72. Washington, D.C.

———. 1859. The Coleoptera of Kansas and eastern New Mexico. Smithsonian Contrib. Knowledge 11(6): 1–66, 3 pl.

Marcus, L. F. 1960. A census of the abundant large Pleistocene mammals from Rancho La Brea. Los Ang. Cty. Mus. Contrib. Sci. 38: 1–11.

Martin, L. D. and A. M. Neuner. 1978. The end of the Pleistocene in North America. Trans. Nebr. Acad. Sci. 6: 117–126.

Matthews, E. G. 1961. A revision of the genus *Copris* Muller of the Western Hemisphere (Coleoptera, Scarabaeidae). Entomol. Am. 41: 1–139.

Matthews, E. G. and G. Halffter. 1968. New data on American *Copris* with discussion of a fossil species (Coleopt., Scarab.). Ciencia (Mex. City) 26: 147–162.

Matthews, J. V., Jr. 1977. Tertiary Coleoptera fossils from the North American arctic. Coleopt. Bull. 31: 297–308.

Miller, S. E. and S. B. Peck. 1979. Fossil carrion beetles of Pleistocene California asphalt deposits, with a synopsis of Holocene California Silphidae (Insecta: Coleoptera: Silphidae). Trans. San Diego Soc. Nat. Hist. 19: 85–106.

Pierce, W. D. 1946a. Fossil arthropods of California. 10. Exploring the minute world of the California asphalt deposits. Bull. South. Calif. Acad. Sci. 45: 113–118.

———. 1946b. Fossil arthropods of California. 11. Descriptions of the dung beetles (Scarabaeidae) of the tar pits. Bull. South. Calif. Acad. Sci. 45: 119–131.

———. 1946c. Fossil arthropods of California. 12. Description of a sericine beetle from the tar pits. Bull. South. Calif. Acad. Sci. 45: 131–132.

Stock, C. 1956. Rancho La Brea: a record of Pleistocene life in California. Nat. Hist. Mus. Los Ang. Cty. Sci. Ser. 20: 1–81.